

State of California  
The Resources Agency  
DEPARTMENT OF WATER RESOURCES  
Northern District

RECREATION USE SURVEY OF  
RED CLOVER CREEK, PLUMAS COUNTY  
1991

Technical Information Report No. 92-1

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This report was prepared to summarize information collected under Work Order 1501-0100 to document recreation and fishing use on Red Clover Creek, a major undeveloped tributary to Indian Creek, in the North Fork Feather River drainage. This report has received only limited review; it is intended for internal use and should be considered preliminary and subject to revision.

December 1992

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## SUMMARY

A survey of streamside recreation along Red Clover Creek, Plumas County, was made in 1991. This survey was made to estimate the amount and types of recreation occurring along a fairly remote stream previously authorized for a State Water Project reservoir. The random sample survey combined roving use counts with interviews of anglers and other recreationists to gather information on recreation use, activities, visitor origin, and angler success. Survey data gathered on Red Clover Creek will provide baseline data to help plan potential future projects in the area, and to help evaluate the erosion control project constructed in Red Clover Valley in 1985 as part of a Coordinated Resource Management Project.

There were an estimated 15,000 hours of recreation use on approximately 25 miles of Red Clover Creek, between Red Clover Valley and the junction with Little Last Chance Creek, from April 27 to November 3, 1991. The most frequently observed activities were camping, fishing, relaxing and hunting. About 34 percent of the visitors and 36 percent of the anglers lived in the Sacramento Valley, mostly Butte and Sacramento Counties.

Anglers caught an estimated 1,150 rainbow trout (0.38 per hour) and 170 brown trout (0.06 per hour) in 3,000 hours of fishing. The mean fork lengths of creel fish were 22.6 cm for rainbow trout, and 23.2 cm for brown trout.

## INTRODUCTION

This report describes the first in-depth recreation use survey of Red Clover Creek. The purpose of this survey was to estimate the amounts and types of recreation use and angler success occurring along the creek.

In 1977, a limited survey of the lower seven miles of Red Clover Creek (upstream to Notson Bridge) was conducted as part of a recreation survey at Indian Creek. This survey covered lower Red Clover Creek as a substitute for the 11 miles of Indian Creek below Antelope Dam where the access road was closed for reconstruction.

Using a stratified random sampling procedure, the 1991 survey combined roving use counts with interviews of recreators in order to gather information on recreation activities, visitor origin, and angler success. Estimates of use were made for the period of April 27, 1991 to November 15, 1991. This report describes the recreation use survey, creel census, and results for the 1991 trout season. A separate report, prepared by the Department of Fish and Game, Contract Services Section, describes a fish population survey conducted in August 1991 (Brown 1992).

## DESCRIPTION OF STUDY AREA

Red Clover Creek is located in the Upper Feather River Basin in northern Plumas County within the Plumas National Forest, 60 miles northeast of Truckee, 22 miles northwest of Reno, and 30 miles southeast of Quincy (Figure 1). This region is referred to as the Diamond Mountains. The creek flows to the northwest through 27 miles of diverse topography, including broad valleys and steep and narrow canyons, to its confluence with Last Chance Creek and Indian Creek in Genesee Valley.

In addition to rain and snow runoff, many spring-fed tributaries periodically contribute to the flow of Red Clover Creek. The largest tributary watersheds are those of Crocker and Dixie Creeks. These latter two, and other tributaries including Crystal Creek, several unnamed tributaries, and an unnamed stream herein termed "Julie Creek", are perennial.

Most of the Red Clover Creek Basin is uninhabited, although a few residences and vacation homes exist near the mouth in Genesee Valley. Most of the mountain and foothill lands are owned and managed by the U. S. Forest Service for timber production, wildlife management, grazing, recreation, and watershed management. There are no developed campgrounds along Red Clover Creek, however, there are several areas that offer suitable camping, and are frequented by campers, hunters, and fishermen. County Route 111, a dirt and gravel road, follows the creek from Red Clover Valley to Genesee Valley, and is referred to as the Genesee-Beckworth road.

The survey reach included about 25 miles of Red Clover Creek beginning at USFS Route 26N70 in Red Clover Valley, elevation 5,400 ft., and ending at the confluence with Little Last Chance Creek, elevation 3,720 ft. The upper reach is within Red Clover Valley, where the creek meanders through fine to gravelly loam soils that have been subject to accelerated erosion. The majority of this section is privately owned grazing land with the

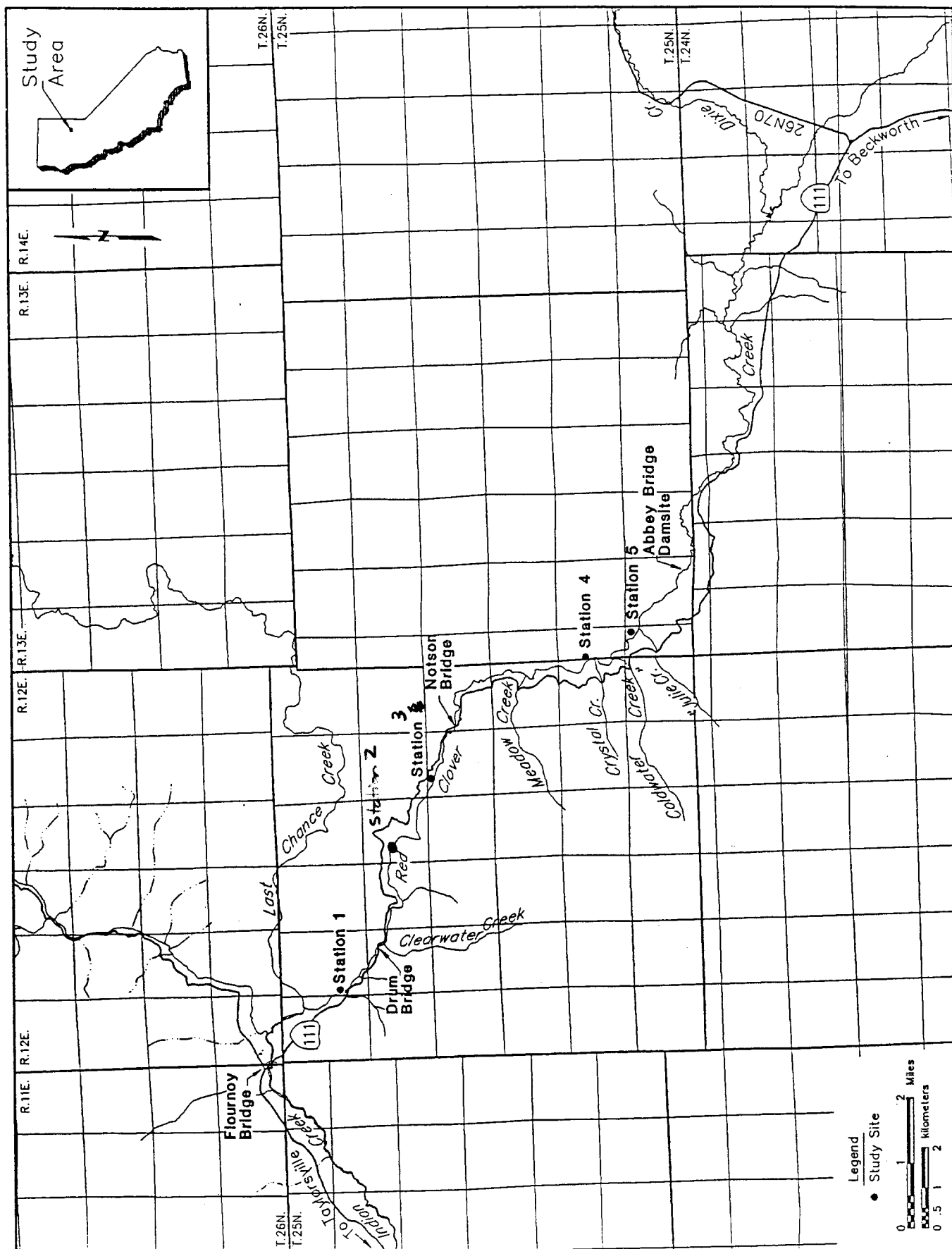


Figure 1. Study Area, including stations sampled to estimate standing stocks of fish (Brown 1992) in Red Clover Creek, Plumas County, 1991.

vegetative community primarily consisting of big sagebrush scrub. Dominated by sagebrush, the vegetation includes common rabbit-brush, northern antelope bush, and several grasses. This reach contains only a few public access points, the most popular of which is Abbey Bridge, primarily a day use area.

The middle reach, between lower Red Clover Valley and Notson Bridge, descends into a moderately steep volcanic canyon where distinct lava flows of Ingalls and Lovejoy formations are exposed. In this reach the creek flows through eastside ponderosa pine forest, comprised of ponderosa, jeffery, and lodgepole pines, western juniper and incense cedar.

There are several rough roads branching off the Genesee-Beckworth road in the middle reach which lead to campsites along the creek. Four such roads exist in the upper section of the middle reach, the downstream-most leading to a large undeveloped creekside area. This site is capable of accomodating ten or more individual camps. Four wheel drive is advisable on many of these roads.

The lower reach is confined within a long, steep canyon where Red Clover Creek flows around large granitic boulders. This reach, extending from Notson Bridge to Genesee Valley, has a fairly dense montane riparian forest populated with cottonwood, jeffery pine, white fir, and aspen. Vehicle access to the creek in this section is limited to near the ends of the reach. A popular camp is located 1/4 mile below Notson Bridge, where the road and the creek begin to diverge. For the next five miles only two unimproved, unmarked trails lead down to the creek. As the road re-approaches the creek there are several campsites in Oak Flat, with another suitable camping site on the creek at Drum Bridge. From Drum Bridge downstream to the private lands near the mouth there is good fishing access.

Four species of fish are known to occur in Red Clover Creek. These include rainbow trout (Oncorhynchus mykiss), brown trout

(Salmo trutta), Sacramento sucker (Catostomus occidentalis) and speckled dace (Rhinichthys osculus).

Julie Creek is populated with brown trout, and Crystal Creek supports a small rainbow trout population.



## METHODS

### Recreation Use Counts

Use counts were made on randomly selected dates within ten survey strata using the optimum allocation method described by Abramson and Tolladay (1959). Thirty days of the 203-day period from April 27 through November 15, 1991, were surveyed; both days of the opening weekend of trout season, 4 of 10 holiday weekend days, 13 of 141 weekdays, and 9 of 48 weekend days, and both days of opening weekend of deer hunting season (Zone 6a, 6b).

Three 1.5 hour counts (only two counts in November due to waning daylight hours) of recreation use were made in the study area each survey day at regular periods, scheduled according to the number of daylight hours (Appendices I and II). The surveys were made from a vehicle or on foot, as necessary, to check access and recreation sites. Recreationists (and their vehicles) were counted and recorded by recreation activity. The three daily counts were totalled and multiplied by factors that accounted for recreation use during the daylight periods not surveyed. Similarly, the resulting daily figures were expanded to estimate total recreation hours for all days in each stratum. Adding the stratum totals provided an estimate of recreation hours for the study period.

We observed loggers, truck drivers, and U. S. Forest Service employees working along Red Clover Creek during the summer. We did not include them in the estimates of use because they generally did not engage in recreation along the creek.

### Creel Census

Anglers along Red Clover Creek were contacted on the same 30 days described above to determine fishing success. The county of residence and length of time spent fishing so far that day were recorded for each angler contacted. Fish censused were counted, measured (fork length to nearest 0.5 cm), and identified to species.

To determine total catch, the catch per hour was multiplied by estimated hours of fishing for each stratum and the totals for each stratum were summed. Total weight of trout caught was calculated from estimated total catch and application of the length-weight relationship formula for Red Clover Creek trout (Brown 1992).

## RESULTS

### Recreation Use

Total recreation use on Red Clover Creek, from Red Clover Valley to Genesee Valley, was estimated at 15,000 recreation hours ( $\pm$  4,600 hours) for the period April 27 to November 15, 1991. Based on counts of recreationists, camping was the major activity, followed by fishing, relaxing, and miscellaneous activities. (Table 1). Use counts reflect what recreationists were doing when seen and the number of hours spent on each major activity, but did not provide data on other activities that people pursued at other times during their stay.

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Table 1. Recreation Hours by Activity, Red Clover Creek,  
Red Clover Valley to Genesee Valley

<u>Activity</u>	<u>Recreation Hours</u>	<u>Percent</u>
Camping	8,000	54
Fishing	3,000	20
Miscellaneous*	2,000	13
Relaxing	1,500	10
Hunting	<u>500</u>	<u>3</u>
	15,000	100

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\* Includes beach use/swimming, sight seeing, children playing, and OHV use.

In addition to the use counts, 145 interviews of recreationists were conducted during the 1991 season, representing 391 people. The interviews provided more detailed information on activity participation and additional information on visitor characteristics. About 51 percent of the recreationists interviewed said they fished during their visit to Red Clover Creek, and about 21 percent said they were relaxing. Other activities included

hunting (10 percent), swimming/beach use (17 percent), walking for pleasure (4 percent), bicycle, motorcycle or off road vehicle use (3 percent), and sightseeing (4 percent). About 1 percent of the people interviewed mentioned miscellaneous other activities. These percentages total more than 100 percent because many people engage in more than one activity (Table 2).

Table 2  
Percent of People Participating in each Recreation Activity,  
from Interview Data (N = 391)

<u>Activity</u>	<u>Percent of People</u>
Camping on Creek	70
Fishing	51
Just Relaxing	21
Swimming/beach use	17
Hunting	10
Crayfishing	6
Walking for Pleasure	4
Sightseeing	4
Bicycle riding	2
Picnicking	1
OHV	1
Miscellaneous	<u>1</u>
Total	188*

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\* Total exceeds 100 percent since many people participated in more than one activity.

About 70 percent of the visitors camped along Red Clover Creek, 24 percent were day users and returned home at night, and 6 percent stayed overnight in the area somewhere other than at Red Clover Creek. Some of the latter camped at Lake Davis or Antelope Reservoir, but a few stayed with friends or relatives in the Genesee area, at motels or resorts, private campgrounds, or summer cabins. Camping accommodations along the creek included tents (72 percent), pickup camper (15 percent), travel trailers (12 percent), and tent trailers (2 percent). The popularity of

tents was probably due to the rough roads and poor access for trailers. The average length of stay for visitors camped along Red Clover Creek was 2.3 days.

Most recreational visitors to Red Clover Creek came from the Sacramento Valley, Nevada, Northeast Counties, San Francisco Bay area (Figure 2).

#### Creel Census Data and Angler Success

During the 1991 trout season, 166 anglers were contacted, with an average length of stay 3.1 hours for completed efforts. They had fished 461 hours, with an observed catch of 34 brown trout and 163 rainbow trout. In addition, a total of 118 trout were reported caught, or reported to have been caught and released.

Total angling use was estimated at 3,000 hours ( $\pm 700$  hours) or 967 angler days, with an estimated catch of 170 brown trout (0.06 per hour) and 1,150 rainbow trout (0.38 per hour). Based on reported catch and release, as many as 860 additional trout may have been caught and released. No other species of fish were observed or reported to have been caught this year.

About 54 percent of the anglers censused fished with bait, 11 percent with lures, 2 percent with flies, and about 33 percent fished with some combination of these methods, mostly bait and lures.

The mean fork length of brown trout caught during 1991 was 23.2 cm (9.13 in.) with a range of 18.0 to 42.5 cm (7.0 to 16.7 in.) (Appendix III). The mean fork length of rainbow trout was 22.6 cm (8.9 in.) with a range of 13.0 to 38.1 cm (5.1 to 15 in.) (Appendix IV). An estimated 37.6 kg (83 lbs.) of brown trout and 205.5 kg (453 lbs.) of rainbow trout were caught. A brown trout measuring 42.5 cm (16.7 in.) and a rainbow trout 38.1 cm (15.0 in.) in length were the largest fish observed this year.

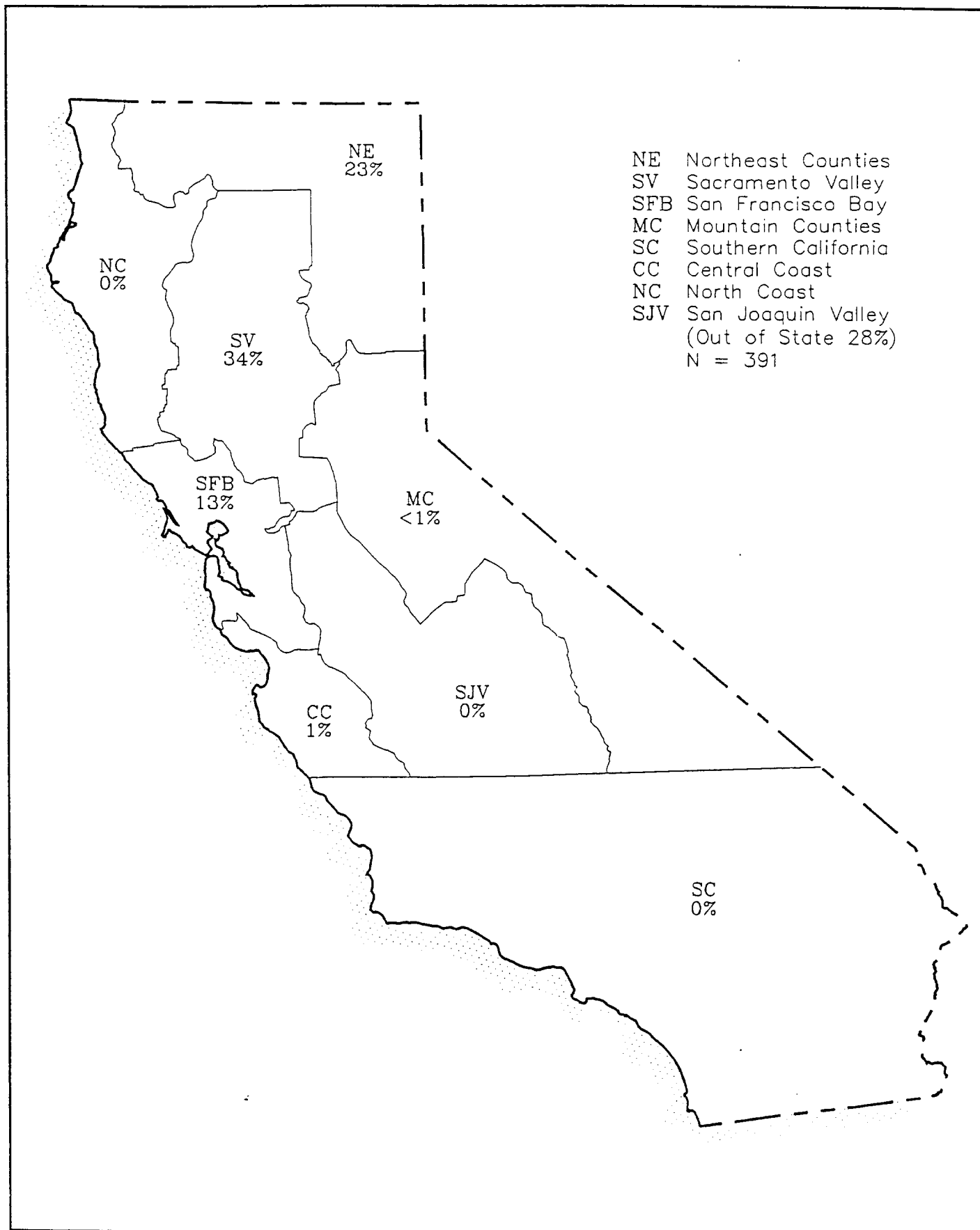


Figure 2 - Red Clover Creek Visitor Origin By County Groups  
1991

Red Clover Creek angler origin was primarily from out of the area (Figure 3). Most of the anglers came from the Sacramento Valley (36 percent), San Francisco Bay area (25 percent), and the Northeast Counties (26 percent).

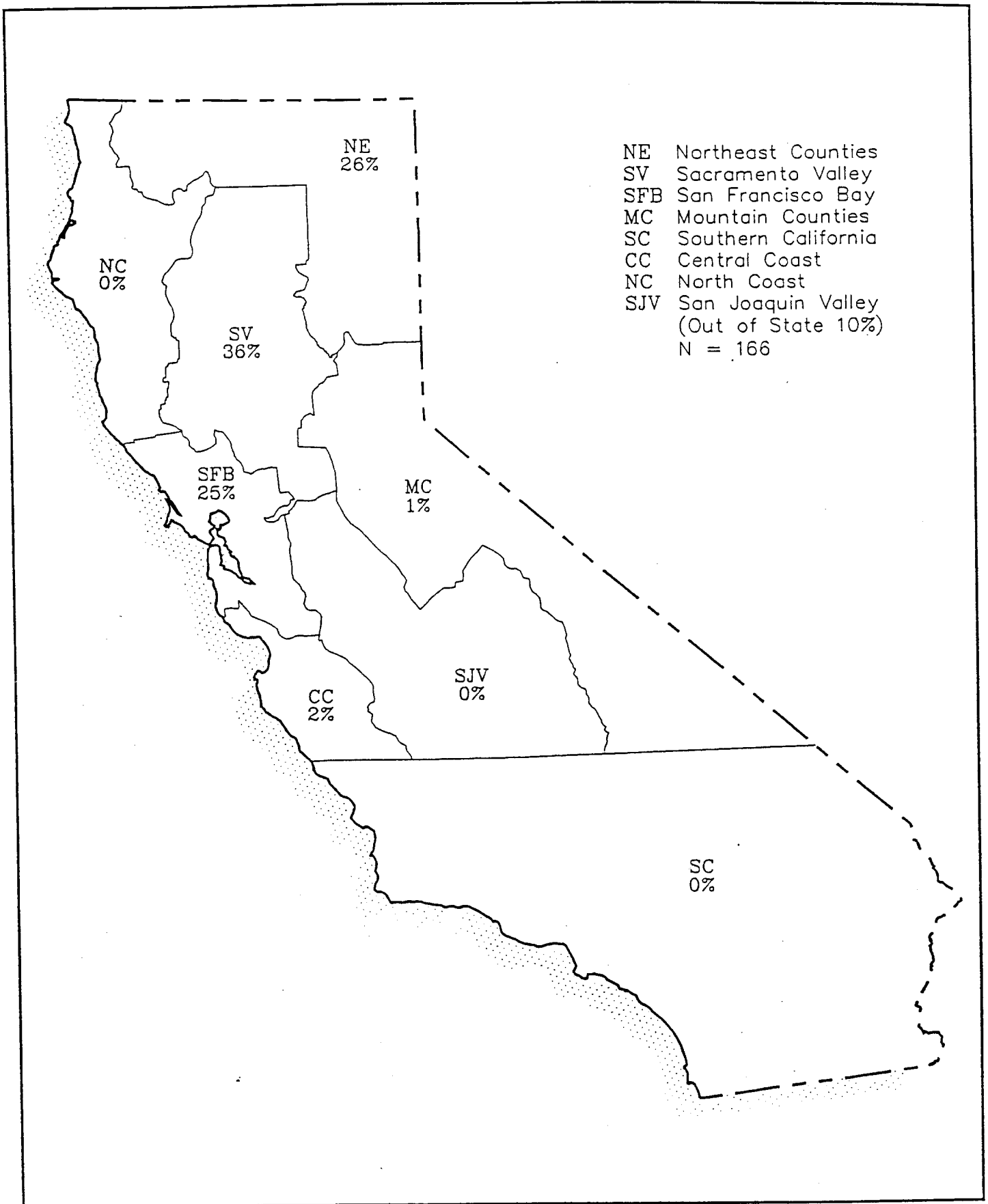


Figure 3 - Red Clover Creek Angler Origin by County Groups  
1991



## DISCUSSION

### Limitations of Use Counts and Creel Census

Understanding the limitations of the recreation use survey and creel census helps put the data obtained in perspective. Most recreationists on the creek were readily observed during the use counts, but accurate counts were difficult in some areas where the creek was not visible from the road. Experienced anglers tended to park along the road and hike to various fishing spots. Vehicle access points were checked on each count, but people were not found for some vehicles. Vehicle counts were not utilized in this survey, because vehicles of USFS workers, loggers, and other non-recreationists often park along the road on Red Clover Creek, making vehicle counts a poor index of recreation use.

Use on Red Clover Creek was heaviest in the spring months and about 41 percent of the annual recreation and 80 percent of the fishing occurred by the end of June. The major activities were camping, fishing, and relaxing. Overall, the best fishing probably occurs before July. Fishermen reported the best success in the morning hours (before noon for both rainbow and brown trout), although evening fishing (after 4 p.m.) was also good. Morning and evening periods nearly always provided better fishing than mid-day. About 15 percent of the estimated fishing use was represented in the creel census.

Most of the exceptionally large fish observed in the creel census were caught on the opening weekend or early in the season. The opening weekend had the highest angling use of the year (about 14 percent of the annual use) but lower fishing success than the later strata.

The places of residence for anglers at Red Clover Creek were slightly different than those of general recreationists. Residents of the San Francisco Bay Area made up 25 percent of the anglers while only 13 percent of the general recreationists were from this area. Out-of-state residents made up 28 percent of

general visitor origin while only 10 percent of the anglers were from out of state. This was probably due to the necessity of purchasing a relatively costly out-of-state fishing license.

Comparison of this survey to data collected in 1977 is of limited utility. In 1977, the lower seven miles of the Red Clover Creek was substituted for part of the 1977 Indian Creek survey. For the lower seven miles of Red Clover Creek, total estimated recreation hours were 6,450. The 1977 survey included only three strata, only eleven surveyed days in a 101-day study period, and the opening weekend of trout season was not included in the survey.

## ACKNOWLEDGEMENTS

The use counts, creel censuses, and interviews were conducted by the author with thanks to Doug Rischbieter, for his help on opening weekend and six other survey days. Also, thanks to Laurie Archambault and Glenn Yoshioka for their help on opening weekend.

Thanks to Mike Serna for preparing the figures and Lori Miles who typed the text and tables.

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# APPENDIX I

## RECREATION SURVEY SCHEDULE FOR RED CLOVER CREEK 1991

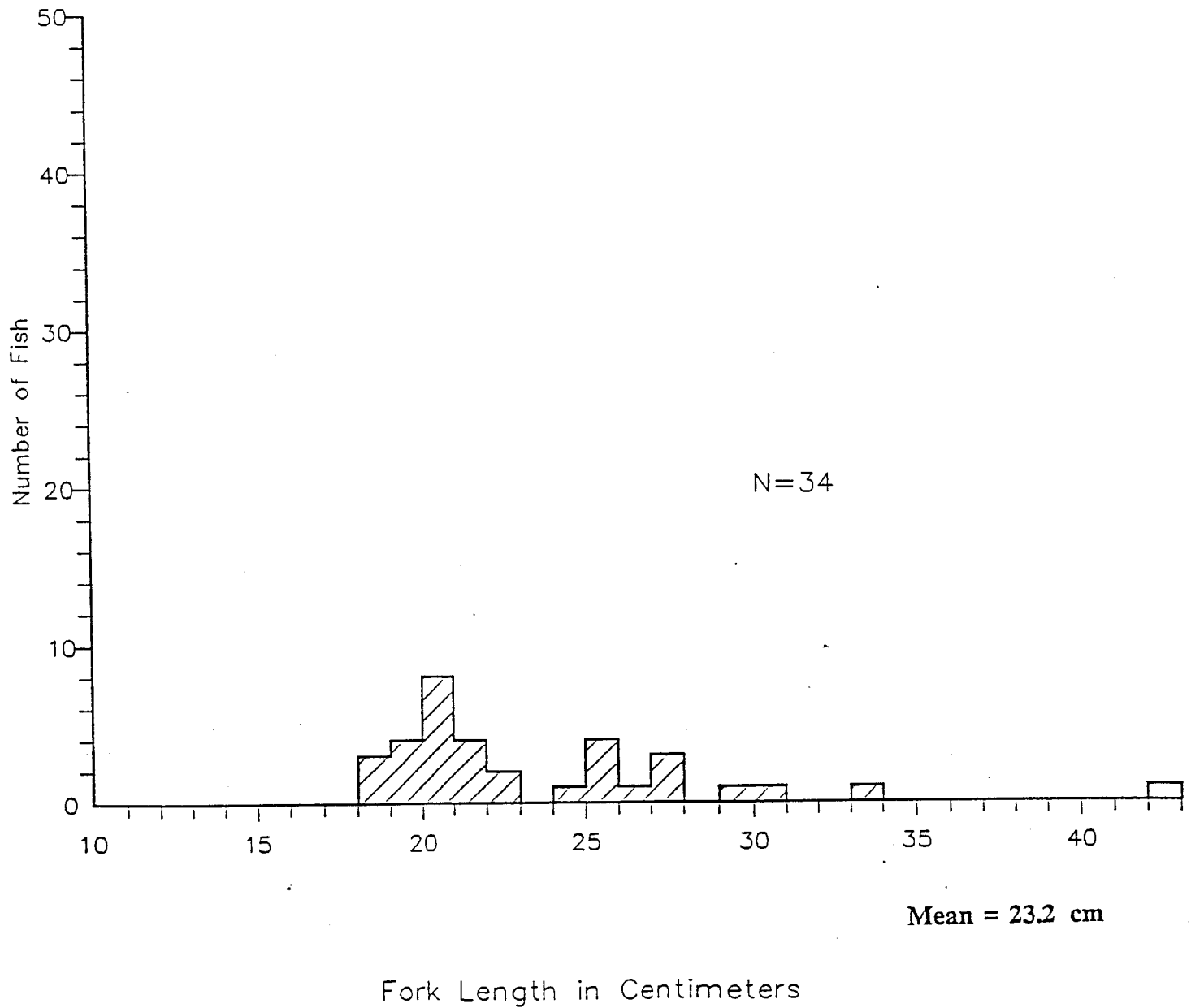
	<u>Stratum</u>	<u>Days in Stratum</u>	<u>Days Surveyed</u>	<u>Dates</u>
I	Opening WE	2	2	April 27, 28
II	Memorial WE	3	2	May 25, 27
III	May-June WE	16	4	May 12, 18 June 8, 23
IV	May-June WD	44	6	May 2, 9, 15 June 3, 19, 27
V	July-August WE	14	3	July 13, 28 August 17
VI	July-August WD	43	5	July 2, 18, 30 August 8, 21
VII	Sept-Oct-Nov WE	18	2	Sept 14, Nov 3
VIII	Sept-Oct-Nov WD	54	2	Sept 26, Oct 22
IX	July 4-Labor Day WE	7	2	July 4, Sept 1
X	Opening WE Deer Hunting WE	2	2	Oct 5, 6
	Totals	203	30	

# APPENDIX II

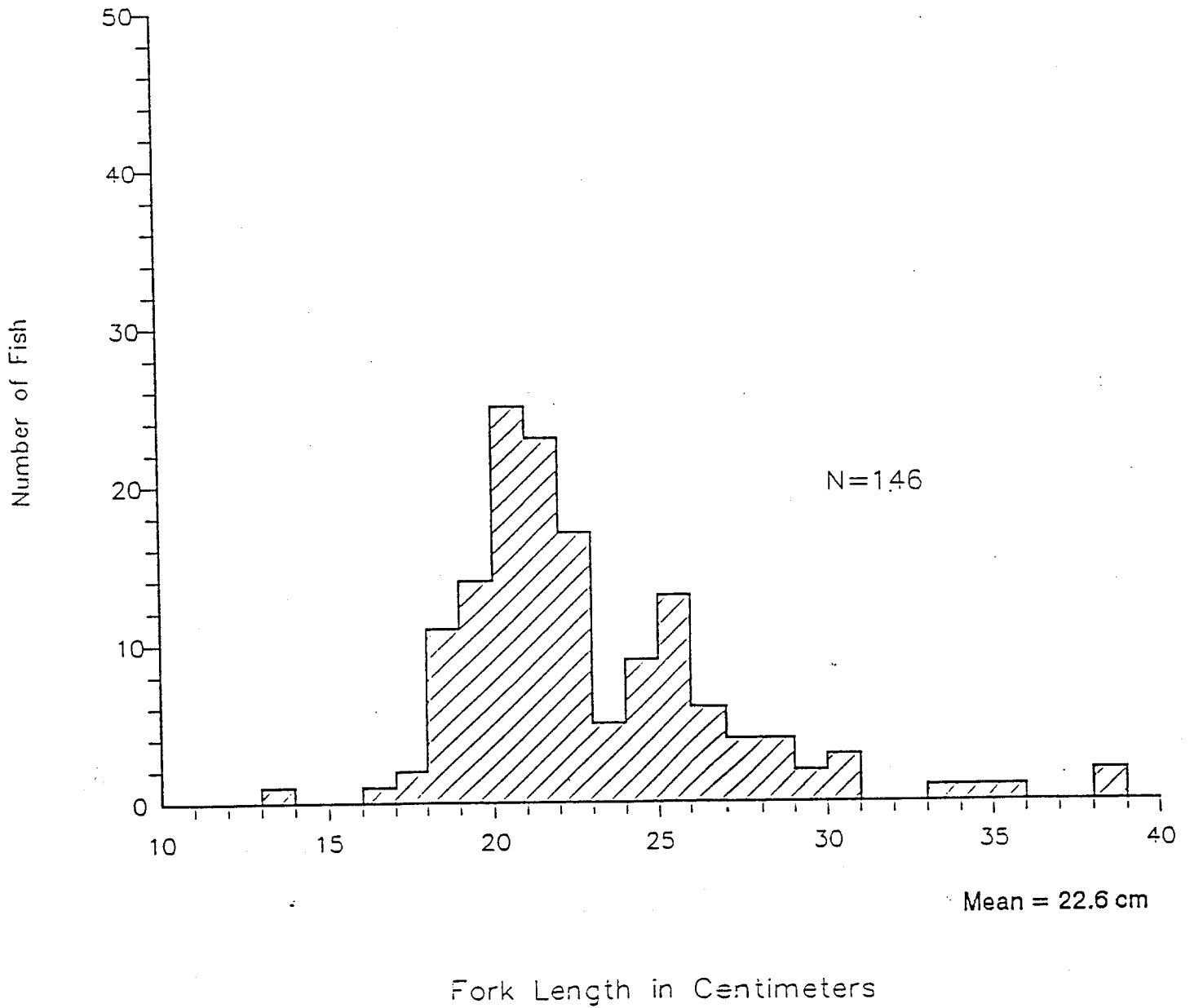
## 1991 RED CLOVER CREEK RECREATION USE COUNT SCHEDULE

<u>Date</u>	<u>Daylight Hours</u>	<u>Use Count</u>		<u>Creel Census Time (approx.)</u>
		<u>Count</u>	<u>Time</u>	
April 27-28 PDT	15-1/2	1st	0700-0930	0800-0930
		2nd	1130-1500	1300-1500
		3rd	1700-1930	1500-1900
May-August PDT	16-1/2	1st	0700-0930	0800-0930
		2nd	1130-1500	1300-1500
		3rd	1730-2000	1500-2000
September PDT	14	1st	0730-1000	0900-1200
		2nd	1230-1430	1500-1800
		3rd	1600-1830	
October PDT	13	1st	0730-1000	0900-1230
		2nd	1230-1430	1400-1800
		3rd	1600-1830	
November PST	12	1st	0730-1030	0800-1200
		2nd	1400-1630	1300-1700

Appendix III  
Length Frequency of Censused  
Brown Trout, Red Clover Creek  
1991



Appendix IV  
Length Frequency of Censused  
Rainbow Trout, Red Clover Creek  
1991





APPENDIX V  
RED CLOVER CREEK MILEAGE  
(Road Miles)

<u>Location</u>	<u>Road Miles</u>
Flournoy Bridge	0.0
1st Barn	0.4
End of Pavement	1.1
National Forest Boundary	1.4
Spur to Creek	2.5
Drum Bridge, Campsite	2.7
Oak Flat Campsites	2.8
"Major" Intersection at Hill Crest	5.6
Flat/Campsite	7.0
Notson Bridge, Campsite	7.5
Meadow Creek	8.6
Dead End Road Campsite	9.7
Coldwater Creek	11.3
Spur road - large campsite, Julie Creek	12.0
<u>Rough</u> road to campsite	12.6
Jeep Road to Creek, Campsite	14.4
Access to Abby Bridge	15.6
Cattle guard (valley narrows)	17.0
Clover Valley Ranch	20.2
Intersection of paved road	21.7
Paved Road crosses Red Clover Cr. (End of Survey Route)	22.3

APPENDIX VI  
LOCATION AND DESCRIPTION OF CAMPSITES

Drum Bridge -	Has a small campsite next to the road with good fishing access and room for two tents or trailers.
Oak Flat -	Has 3 to 4 campsites along the creek that are only about 100 feet off the main road.
Flat/Campsite -	Has a fairly large campsite at the head of the canyon. Could accommodate two travel trailers and/or several tents. Good fishing access. Sometimes occupied by logging personnel.
Notson Bridge -	There are two good campsites here on either side of the bridge in a small valley. Has good creek access.
Dead End Road -	Large undeveloped campground with up to five campsites along the creek and five or more scattered throughout the trees. Good fishing access. Used heavily on holidays.
Spur Road - (Julie Creek)	To the right of the spur road is one campsite along Julie Creek, a small tributary to Red Clover Creek. The road drops off a large gravel flat to two other campsites along Red Clover Creek. Good fishing access.
Rough road to campsite -	Large campsite along creek. Very rough 4WD road. Good fishing access.
Jeep road to creek -	Large open campsite. Good creek access.
Access to Abby Bridge -	Day use or possible campsite along the creek. Open with no trees.